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ABSTRACT

This report describes the Florida Vocational Division's efforts to increase the quality, validity, transportability, and availability of curricular materials through use of performance objectives; establishment of a curriculum laboratory; adoption of systematic models for instructional design; and establishment of a diffusion/dissemination system. Section I is an introduction to the material. Section II discusses the early efforts to develop valid catalogs of objectives and the subsequent organization of the Vocational-Technical Education Consortium of States (V-TECS). Section III contains four models for curriculum laboratories considered by the Division and describes the model that was adopted. Section IV describes the systematic procedures used in instructional development and presents profiles on six projects that utilized those procedures. Data from curriculum projects in career education, activity-based instruction, automotive mechanics, employability skills, and nursery operations are compared in terms of need assessment, target population, objectives, resource allocation, field tests, and diffusion and dissemination. Section V details the procedures used by the Division to establish a dissemination/diffusion system designed to facilitate the acceptance and installation of products designed to enhance student achievement. Section VI presents summary observations and conclusions, describing the present Florida curriculum development system. Flow charts and a bibliography are included. (Author/CT)

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Florida's Vocational Curriculum System:
Issues In Statewide Curriculum Development

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U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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This paper describes the Florida Vocational Division's efforts to increase the quality, validity, transportability and availability of curricular materials through use of performance objectives; establishment of a curriculum laboratory; adoption of systematic models for instructional design; and establishment of a diffusion/dissemination system.

The Division's development and use of performance objectives are described.

Five organizational models for statewide curriculum development are discussed.

Data from curriculum projects in career education, activity-based instruction, automotive mechanics, employability skills and nursery operations are compared in terms of need assessment, target population, objectives, resource allocation, field tests and diffusion and dissemination.

Conclusions and future plans are presented.

The concepts and opinions expressed in this paper are an attempt to accurately describe what has happened in state-level vocational curriculum development in Florida in the past few years. They do not, however, necessarily represent the concepts and opinions of the Florida State Department of Education, the Division of Vocational Education, Florida State University, or the Career Education Center.

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Florida's Vocational Curriculum System: Issues in Statewide Curriculum Development

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I. INTRODUCTION

Two factors have combined to create an instructional crisis in Florida's vocational-technical classrooms. The first factor is the seemingly geometric increase in the number of students. Since 1971, vocational education enrollment has more than doubled, and by 1980 will have more than tripled (Bonar, Medsker, & Moore, 1976). The second factor is accelerating technological change, which is ubiquitous and may be the outstanding characteristic of our era. Together, these two factors have made the traditional teacher-centered, lecture-demonstration instructional model obsolete.

Whereas, in the past, a vocational-technical teacher could be expected to interact personally and demonstrate skills to each student in a small group, it is practically impossible to do the same with 15, 20, even 25 students in a contemporary classroom. To make matters worse, these same teachers must master rapidly expanding domains of knowledge and skills in their fields. Few teachers can claim to be as expert in all areas of their fields as they could even in the recent past, and without this the teacher-dependent model loses its core strength.

The Division of Vocational Education (DVE), Florida State Department of Education recognized this problem and decided that it had to modernize instructional strategies to meet the changing context of vocational-techni-

cal education. In the mid 1960's, it began sponsoring "curriculum development workshops," "curriculum development projects," and supporting university-based teacher trainers to develop "curriculum materials." The common goal of all these activities was to provide teachers with "curriculum materials" which would help them deliver instruction more effectively.

By 1970, however, several problems had been identified which caused the DOE to re-evaluate its dependence on these types of "curriculum development" activities. The materials which resulted were limited by teacher/developers' training, time, and talent. Often, because the teachers felt more competent as subject-matter experts than as instructional designers, they developed "teacher-oriented curricular materials," such as curriculum outlines or guides, rather than "student-oriented instructional (learning) materials." Most teachers had so many demands upon their time that they could not undertake the time-consuming task of instructional materials development. And, as expected, there was a great variation in the teachers' abilities to create instructional materials.

In addition, the summer curriculum workshops often ended before the work was completed, seldom involved validation of the products by anyone other than the developers, and were often focused on the particular interests of the workshop participants, rather than on the needs of similar teachers statewide. More often than not, there was a considerable time lag between when the "curriculum workshops" were finished and when the participating teachers received the fruits of their labors. Many of the products, although potentially of use across the state, never were made available outside of the school district or institutions where they were developed. In spite of notable exceptions, the workshop strategy, as then conceived, had a very limited impact on statewide needs.

As a first effort to improve instructional material development, in 1970, the DVE funded five exemplary vocational projects for disadvantaged students. Each of these projects was committed to the development and operation of a total school program designed to meet the special needs of students who were singularly unsuccessful in conventional school programs.

Geographically isolated from each other, each project's personnel began the identification, adaptation, and development of instructional materials appropriate for the identified population. An early analysis of this situation revealed that: considerable duplication of effort was occurring; different formats were being utilized; the quality of materials varied considerably; and development was proceeding without a systematic design.

In order to deal with these problems, the decision makers in the Division of Vocational Education assigned a professional staff member to assist personnel in all projects with materials development. The staff member was assigned the responsibility for: developing and implementing a model for curriculum development in all of the projects, eliminating duplication, and improving the quality of the materials being developed.

A model for curriculum development was selected and adopted by four of the five projects. The model was based on a job-description-task analysis approach. Instructors, using input from craft committees, developed job descriptions to serve as a base for designing a course. The job description was analyzed to determine the tasks actually performed on the job; then each task was further analyzed to identify the steps necessary for mastery. The identified tasks were used as a basis for developing the performance objectives that consistituted the course. Criterion-referenced test items were

then developed from the objectives. The model also included identifying and describing the target population, developing course prerequisites, developing prerequisite tests, selecting instructional procedures, sequencing instructional units, developing lesson plans, and establishing an evaluation system to improve course efficiency and course effectiveness.

Since the courses to be offered to the students were based on requirements of a particular job, the instructional program was designed to permit vocational and academic instructors to develop materials cooperatively, with academic skills derived from the specified job objectives.

The curriculum materials developed by project personnel using this model were examined by an outside agency and rated as very good. A large number of the materials were reproduced, distributed on a state-wide basis, and used by other systems within the state. Although these materials were rated superior to many others in used in the state for specified students, the following problems were identified:

1. Job descriptions based on input from teachers and a craft committee did not include all the tasks performed by workers on the job.

2. The quality of performance objectives varied considerably: For example, in some instances the criteria for performance were not specifically stated.

3. Criterion-referenced test items were not appropriate for objectives when the criteria were not specifically stated.

4. Reading levels of some of the materials were not appropriate for the target population.

5. Instructional procedures were not always appropriate for the type of performance required by the objectives.

6. Instructional units were improperly sequenced.

7. The instructional materials were validated only in the classrooms of the teachers who prepared them.

These different types of problems are a natural consequence when vocational teachers, who are generally classified as subject matter experts, are responsible for the total development of curriculum materials. After considerable study and consideration of many alternatives, in 1974 decision makers in the DVE -dopted the following long-range policies to guide instructional and/or curriculum materials development:

1. Instructional and curricular material development would be based upon job-related performance objectives.

2. Major instructional or curricular material development projects would be coordinated and/or implemented by a DVE supported curriculum laboratory.

3. Instructional and curricular materials would be adapted, adopted, and/or designed, developed, and validated using systematic procedures.

4. Instructional and curricular materials would be systematically disseminated and diffused to vocational students and teachers.

5. Instructional and curricular materials would be designed, developed, and validated only after the systematic identification and priorization of needs, and only after it was systematically established that materials did not already exist which could be adopted or adapted.

The remainder of this paper is designed to illustrate strategies employed by the DVE to implement policies one through five.

Section II describes the early efforts to develop valid catalogs of objectives and the subsequent organization of the Vocational-Technical Education Consortium of States (V-TECS).

Section III describes four models for curriculum laboratories considered by the DVE and describes the model that was adopted.

Section IV describes the systematic procedures used in instructional development and presents profiles on six projects that utilized those procedures.

Section V describes the procedures used by the DVE to establish a dissemination/diffusion system designed to facilitate the acceptance and installation of products designed to enhance student achievement. Section VI presents summary observations and conclusions, describing the present Florida curriculum development system that has evolved over the past several years.

II. FLORIDA AND V-TECS CATALOGS OF OBJECTIVES

In 1970, a group of nationally recognized educators were selected to serve on a Board of Governors for the Florida Research and Development Program. This board was established to advise the Florida Department of Education regarding promising practices and strategies for improving the statewide educational system. One of the first concerns expressed by the Board was the lack of measures for determining the attainment of specific learning skills.

In response to this particular concern, the Division of Vocational Education (DVE) with assistance from the Research and Development Program constructed catalogs of performance objectives in ornamental horticulture, typing and communication skills, automotive mechanics, and employability skills. The catalogs were designed to: (a) provide measures to use in determining program effectiveness, and (b) provide instructors with objectives, based on expert opinion, that were necessary for job performance in a specific occupation. The "prototype" catalog effort was carefully examined and the following weakness were identified:

1. Lack of quality control. Some objectives did not contain appropriate criterion measures.
2. Incorrectly designed population samples.
3. Expensive. The average cost per catalog was approximately $47,000.00
4. Time consuming. Approximately two years were spent developing each catalog.
5. No provision for revision.

After analyzing the weaknesses of the system for developing catalogs, decision makers in the DVE funded a feasibility study in 1972. The Southern Association of Colleges and Schools (SACS) was selected to organize interested states and agencies who had similar concerns for the improvement and assessment of education programs. As a result of the feasibility study, the Vocational-Technical Education Consortium of States (V-TECS) was organized with SACS as the administering agency. Operationally, V-TECS is a program under the Commission on Occupational Education Institutions (COEI), a division of the SACS organization. The charter membership of V-TECS consisted of seven southern states as members and the Air Force Training Command and the Naval Education and Training Command as associate members. At the present time, V-TECS has a membership of the following eighteen states: Alabama, Delaware, Florida, Georgia, Illinois, Indiana, Kentucky, Louisiana, Maryland, Michigan, Mississippi, New York, Pennsylvania, South Carolina, Tennessee, Virginia, West Virginia, and Wisconsin.

The primary purpose of V-TECS is to develop valid catalogs of performance objectives, criterion-referenced measures, and performance guides for use in vocational-technical education curriculum development. The catalog is a document that describes the tasks actually performed by workers in specific occupations. All data used as a base for catalog development are obtained from persons who are currently employed in the respective occupation, thus assuring information that is relevant to training programs. Also, by using information from current workers, standards can be established which specify the skills that are necessary for successful entry into that occupation.

A comprehensive activity model was developed by V-TECS personnel for use by all states in the membership to guide the development, refinement,

production, diffusion, and updating of products. The implementation of uniform methods and procedures enhances the transportability of products, with a minimum of adaptation, across member states.

Projects are established following an analysis and selection of occupational domain areas for catalog development. For each domain, a state-of-the-art study is conducted and preliminary lists of tasks and tools and equipment are developed based upon the review of existing literature. These preliminary lists are refined by extensive interviewing of incumbent workers and supervisors. The occupational inventory is then compiled and administered to a random sample of incumbent workers. Responses are obtained relative to task performance, task time-spent, task difficulty (optional), and tool and equipment utilization. These data are processed by computer and several standard reports are generated. These reports are used by writing teams to determine those tasks to be converted to performance objectives. A field review version of the catalog of performance objectives, criterion-referenced measures, and performance guides is prepared, field tested, and refined. The final catalog is then developed. Each member state is also required to develop and implement a diffusion plan to insure that the products reach the local users.

V-TECS has several secondary purposes as it develops and operates. These secondary purposes are to:

1. Share research and developmental costs.

2. Minimize duplication of effort in occupational analysis and curriculum development.

3. Share the cost of expensive computer equipment.

4. Share the cost of expensive technical personnel.

5. Promote the concept of performance-based, vocational-technical education with the learner as the focal point.

Member states of V-TECS have produced, or are producing ninety-three catalogs of objectives. Based on this number of catalogs and the Florida investment in V-TECS operations, the catalogs are available to Florida at an average cost of $4,800 each. This is a considerable saving over the $47,000 cost per catalog incurred by the state prior to the organization of V-TECS. It is projected that Florida, acting unilaterally, would require twenty years of development to produce ninety-three catalogs. This projection is based on the present availability of personnel and funds.

Selected catalogs developed by V-TECS have been diffused throughout the state. An inservice training program was developed and approximately 275 persons trained to conduct 3 hour inservice sessions with teachers on a statewide basis. By June 30, 1978, 16,915 catalogs covering 34 titles will have been distributed to vocational personnel. The catalogs serve three major functions. Vocational instructors can use them for curriculum development at the local level and instructional designers can use them as a basis for reviewing existing materials. Further, the objectives from the catalogs serve as the base for curriculum development on projects financed at the state level.

III. MODELS FOR INSTRUCTIONAL/CURRICULAR MATERIALS DEVELOPMENT

Before deciding upon a model for a statewide instructional/curricular material development laboratory, the DVE considered the positive and negative characteristics of four models (a) the Local Coordination Model, (b) the Functionally Decentralized Model, (c) the Subject Matter Expert Model, and (d) the Centralized Model.

The Local Coordination Model: This model is characterized by a variety of local educational agencies (L.E.A.'s - school districts, vocational-technical centers, community colleges, and/or universities) which would be contracted by the DVE to administer instructional/curricular material development projects. The DVE would supply technical expertise and the L.E.A.'s would provide the development staff (see Figure 1).

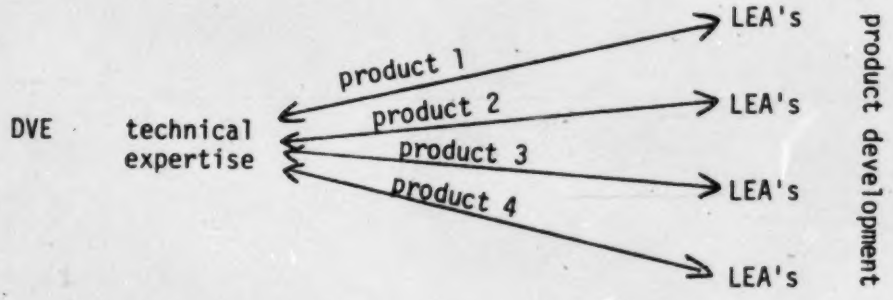


Figure 1. Local Coordination Instructional/Curricular Materials Development Model.

The Local Coordination Model was seen to have the following positive aspects:

1. This model would involve little change from former procedures.
2. It would be politically expedient to have developmental funds spread throughout a broad range of LEA's, rather than focused in one.

3. Potentially, there would be more human resources available if LEA's would cooperate in developmental efforts.

4. The DVE would have direct control of the developmental process.

However, several negative factors early eliminated this model from further consideration:

1. This model was seen by the DVE as promising little change from previously unsuccessful approaches.

2. The DVE did not have, and could not establish positions for, instructional designers who could provide the technical expertise.

3. This model did not contain any inherent characteristics which would increase the quality, validity, and availability of instructional/curricular materials (given condition #2).

4. Only the larger LEA's had human resources capable of participating in such endeavors, and these varied greatly in quality. Also, it was questionable if they would allocate staff to statewide projects.

The Functionally Decentralized Model: This model is characterized by a series of L.E.A.'s, each having responsibility and total control over a portion of the product development process (i.e., instructional design, subject matter expert review, art/graphic design, etc.) in which the L.E.A. is expert. The DVE would assume the functions of interagency coordination (see Figure 2).

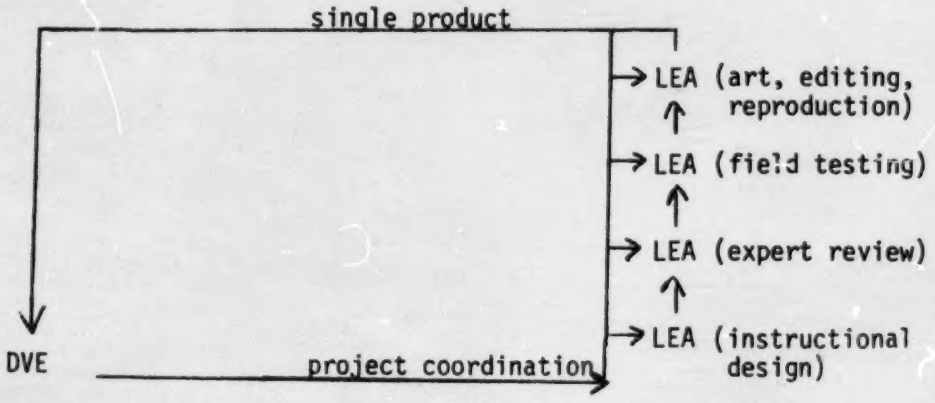


Figure 2. Functionally Decentralized Instructional/Curricular Materials Development Model.

The Functionally Decentralized Model was seen by DVE to have the following positive aspects:

1. It could take advantage of existing technical expertise and resources.

2. It would be politically expedient to have a broad range of L.E.A.'s, with personnel who were recognized as technical experts, involved in the development of products.

3. The DVE would have some direct control of the developmental process.

Again, negative factors quickly eliminated this model from further consideration:

1. No comprehensive study of the technical expertise or resources of the local education agencies had been conducted.

2. The DVE could forsee considerable logistical and political problems in interagency coordination.

3. The DVE did not have the staff, nor could it internally establish positions, for individuals who would coordinate such a system.

The Subject Matter Expert Model: A search of the literature on instructional/curricular materials laboratories indicated that this model was the most commonly used by state departments of education. This model is characterized by a central or core staff which reflects the vocational-technical program areas. The core staff is typically located in a university or some other agency external to the state department of education. The Florida Division of Vocational Education viewed its role in such a model as setting overall policy and providing direction through its program (area or discipline) staff (see Figure 3).

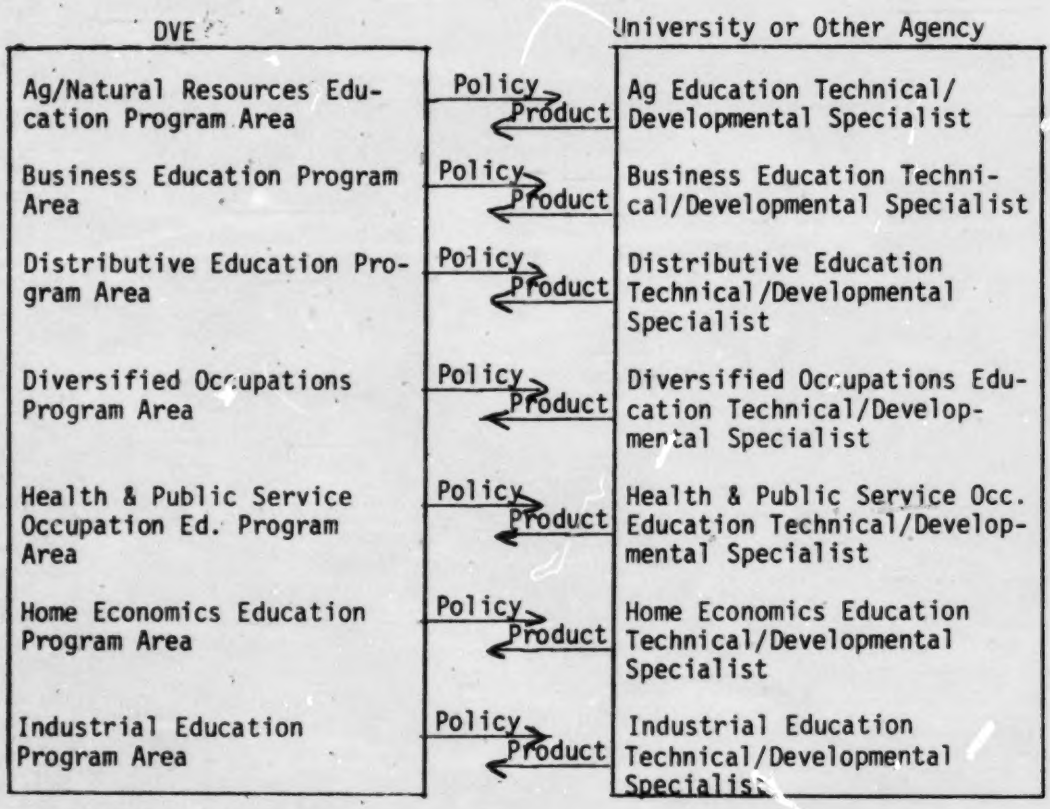


Figure 3. Subject Matter Expert Instructional/Curricular Materials Development Model.

This model had a good deal of support from the DVE personnel for several reasons:

1. It maintained a program or discipline area organizational pattern which was identical to the DVE, as well as many local vocational-technical agencies and, therefore, represented only a modest change from past procedures.

2. Each program or discipline would be clearly and equally represented in the model.

3. It was a "proven" model in the sense that it had been adopted in other states.

4. The DVE was certain that subject matter experts in each of the program or discipline areas could be found.

5. The DVE would, through its program areas, maintain some control over the developmental process.

6. Since this model envisioned an external (to the DVE) institution as the organizational base, DVE could fund all necessary positions without establishing any new positions within its own organizational structure.

However, there were problems which precluded the DVE's adoption of this model:

1. It was doubtful that people could be found that had both the technical expertise in a subject field and the instructional design background to implement systematic developmental techniques. Since it was more likely that people could be found with subject matter expertise, systematic procedures might have to be delayed, modified, or sacrificed altogether.

2. Even if subject matter oriented people could be found, there was some question about the tranferability of their expertise from one subject

area to another, even in the same field; for example, an agriculture "specialist" might not be able to handle projects equally well in horticulture, live stock, grain crops, and/or agricultural mechanics.

3. The DVE did not have homogeneous needs for materials in all program areas, meaning that in a model structured around program areas, with one specialist for each discipline, at times one program area might be overloaded, while another was underutilized.

4. This model did not have inherent capabilities for taking an idea through the entire developmental process to the finished product stage.

5. Locating resources in one institution would make it a vulnerable political target.

The Centralized Model: This model is characterized by the grouping of individuals with different functional skills in one institution, usually located in a university or some other agency external to the funding agency (DVE). The skills represented would cover the entire range necessary to take an idea through the entire developmental process to the product delivery stage. The DVE's role would be to set goals and broadly monitor implementation (see Figure 4).

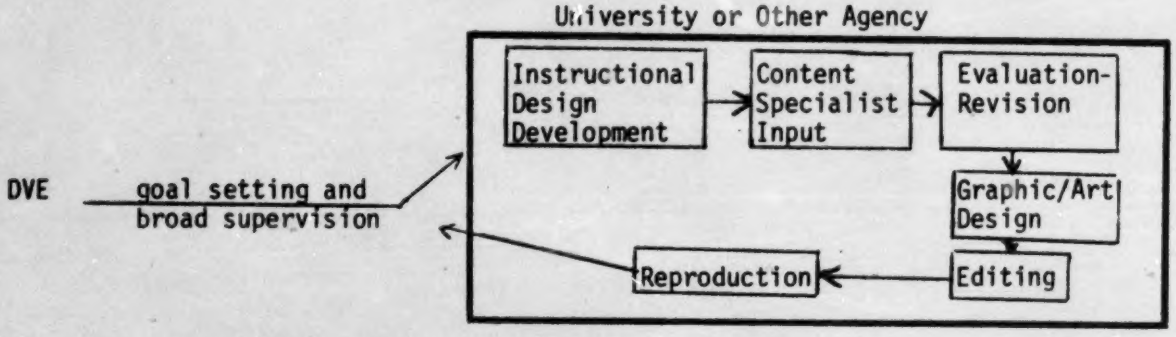


Figure 4. Centralized Instructional/Curricular Materials Development Model.

The Centralized Model had several advantages:

1. It would make it easier to maintain control over all logistical and technical phases of systematic instructional/curricular materials development, since the work was all located under the same roof.

2. It would resolve the dilemma of not being able to recruit individuals with both subject matter and developmental capabilities, in that different people could be hired and combined into task teams which could be organized and disbanded as the need arose.

3. Since the model envisioned an external institution as the organizational base, the DVE could fund all necessary positions without establishing new positions within its own organizational structure.

4. This model had strong proponents in several of the DVE program areas.

5. The model would simplify the application of innovative systematic instructional/curricular design procedures by reducing logistical problems to a minimum.

6. The model could make it possible to sell "finished products' and recoup some of the funds invested in such a substantial operation.

7. The College of Education at Florida State University, which like the DVE is located in Tallahassee, had an outstanding program in Instructional Design and Development. This guaranteed a "local" source of highly trained personnel and a suitable host agency.

8. The DVE had (1973-1974) received delivery of two professional-quality sets of instructional materials which had been produced by task teams of professionals who used systematic procedures to design, develop, and validate the products.

This model had several drawbacks as well:

1. The organizational pattern and procedures inherent in this model were a distinct departure from previous DVE practices.

2. There was uneven support, and even some vocal opposition to this model among the DVE state-level staff. The fact that this model was interpreted to mean that most "curriculum development" functions would be taken from the program areas and given to an external agent engendered considerable opposition.

3. Although the model had been used successfully by business, industry, and the military, only a few state departments of education had attempted such a venture, and in these few instances, each differed in some major aspect from the model.

4. This model, in its ideal form, posed a considerable financial burden and political liability, in that it concentrated unprecedented amounts of resources in a single institution.

The Division of Vocational Education decided that the Centralized Model could best meet its goal to increase the quality, validity, and availability of instructional/curricular materials. In 1974, DVE transformed a small project located at Florida State University's College of Education into a unit called the Career Education Curriculum Laboratory (CECL). The "curriculum laboratory," which would administer six major instructional/curricular material development projects in two years, was initially structured as seen in Figure 5.

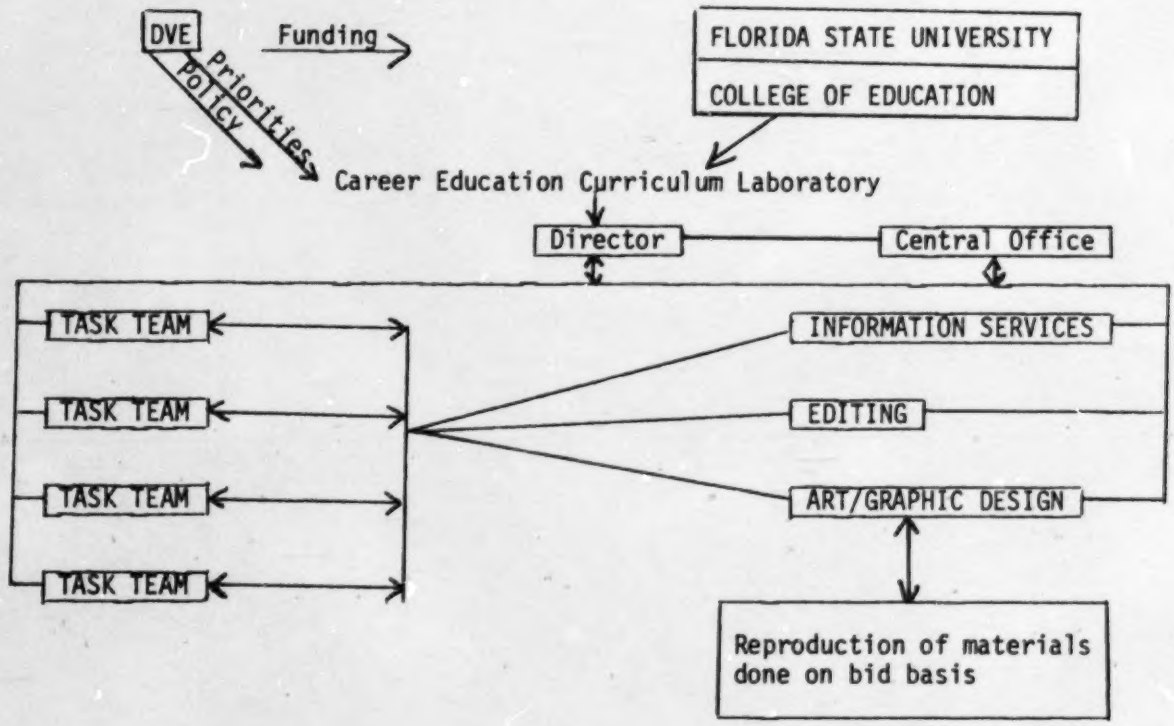


Figure 5. Initial Organization of the Florida Division of Vocational Education, State Department of Education Curriculum Laboratory (CECL).

Each task team in CECL was composed of a team leader, one or more instructional designer/measurement-evaluation specialist(s), a subject matter expert and a full-time or part-time editor, research librarian, and graphic/art designer.

The team leader was responsible for overall planning, coordination, and supervision of team member activities, some instructional design, and agency liaision. The instructional designer/measurement evaluation specialist assisted in the design, field testing, and revision of the materials. The editor was responsible for the language and reading level (if applicable) of the materials. The research librarian provided other team members with

examples of existing materials, general reference support, and copyright clearance. The art/graphic designer was responsible for the visual integrity of the materials, specification of product characteristics (under direction from the team leader), and all contacts and supervision of the reproduction of the materials.

Although a detailed cost-benefit analysis was not done, preliminary estimates led the DVE to conclude that establishing an in-house printing/A.V. reproduction capability would require such a large initial capital investment and potential political liability that the mass reproduction of materials would have to be done by commercial firms.

IV. SYSTEMATIC PROCEDURES FOR INSTRUCTIONAL/CURRICULAR MATERIAL DEVELOPMENT

At the same time that the DVE established a curriculum laboratory as the focal point of its major instructional/curricular material development efforts, it also adopted the use of systematic design, development, and validation procedures. These procedures were intended to insure that the materials met the following criteria:

1. Materials had to incorporate job-related performance objectives as the basis for student objectives.

2. Tests of student performance had to met job-related performance criteria.

3. Materials had to be validated with groups of students and/or teachers representative of the target populations.

The generalized systems model which was used, with some variations, on six major instructional/curricular material development projects is seen in Figure 6.

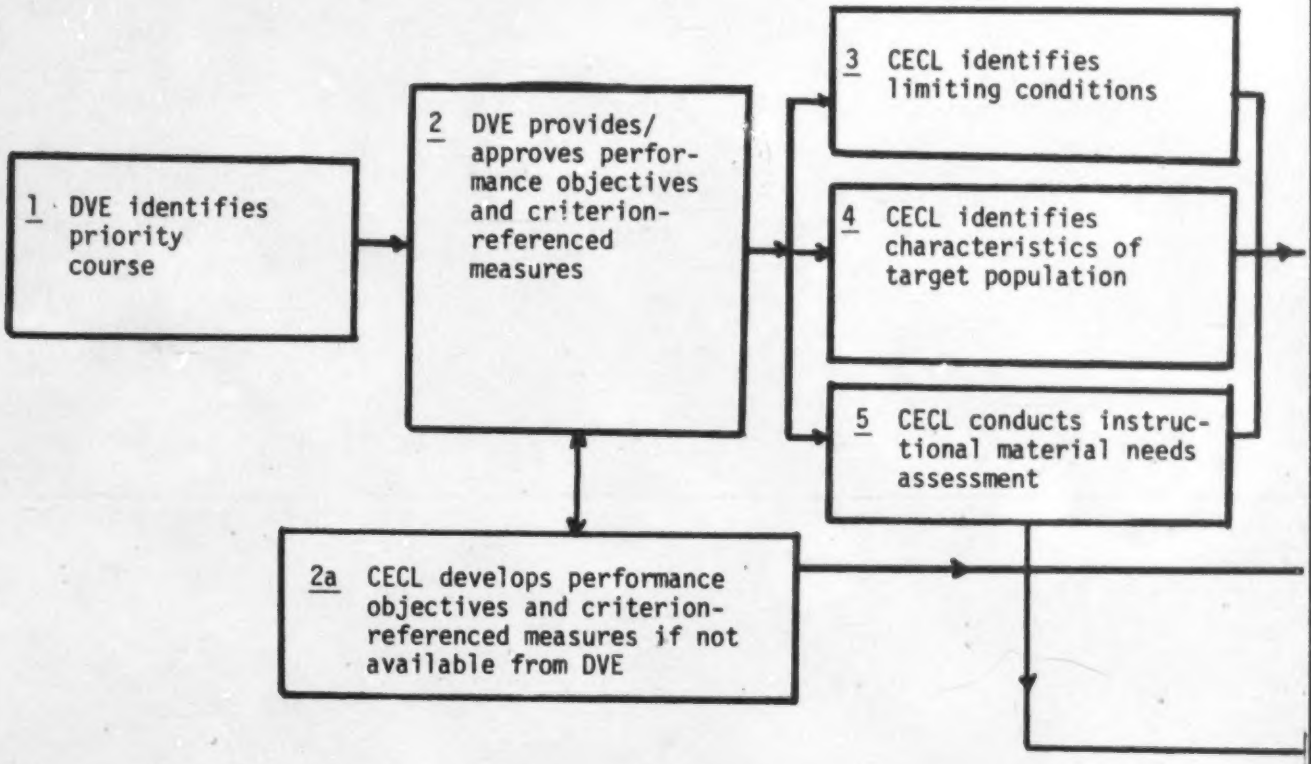

1 DVE identifies priority course
2 DVE provides/ approves performance objectives and criterion-referenced measures
3 CECL identifies limiting conditions
4 CECL identifies characteristics of target population
5 CECL conducts instructional material needs assessment
2a CECL develops performance objectives and criterion-referenced measures if not available from DVE

Figure 6. Systems Model of Instructional Development, Division of Vocational Education (DVE) and the Career Education Curriculum Laboratory (CECL).

1. The DVE funded a "core" of people to conduct steps 1-6 before a proposal for a specific project was developed

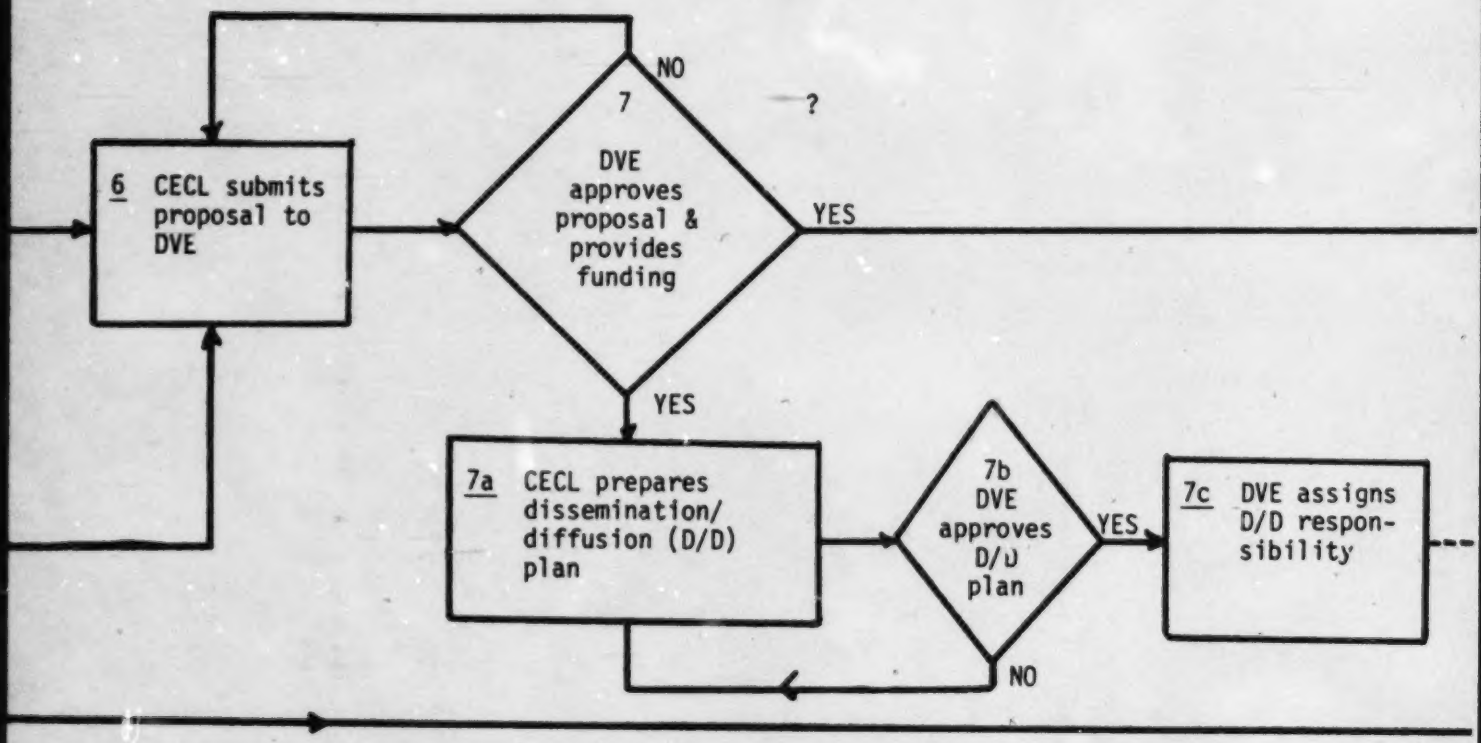
2. The DVE provided performance objectives and criterion-referenced measures for three-or-six projects. These objectives and measures had been validated by teachers and/or workers in the field.

2a. CECL developed performance objectives and criterion-referenced measures for three teacher training projects The objectives were approved by the DVE.

3. CECL was generally limited to print media, slide/tapes, and filmstrips because of the prohibitive costs of developing other media.

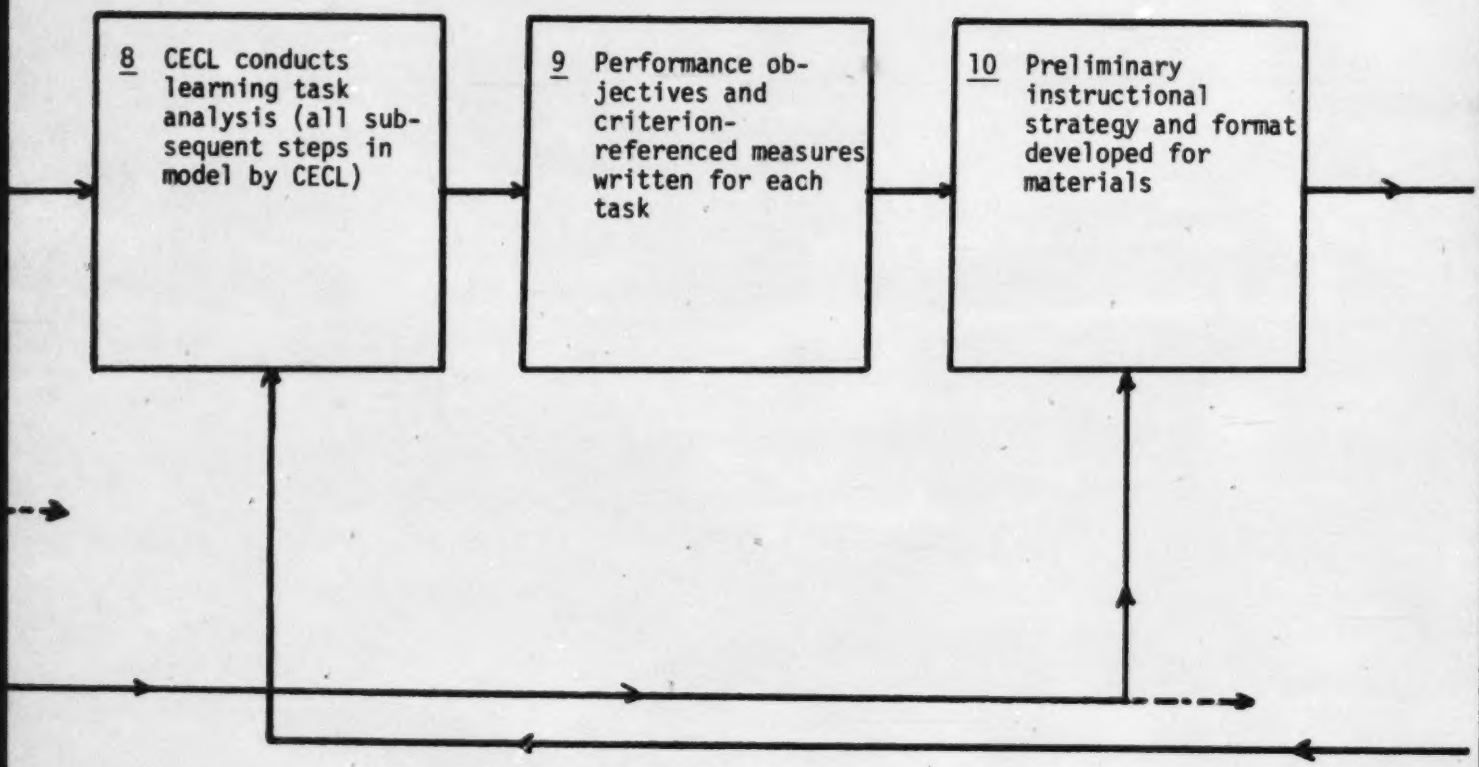
4. Student materials were generally geared to 5-8th grade reading level to accomodate the generally poor reading of many students.

5. The preliminary needs assessment was a gross estimate of the instructional needs, based upon opinions of teachers, and used to prepare the proposal. The assessment continued in some projects from 2-12 months after the preliminary assessment was conducted.



6. Proposals consisted of goals, objectives, procedures, personnel, and a budget. This proposal did not cover the final preparation of "camera ready" copy once the field tests and revisions were complete.

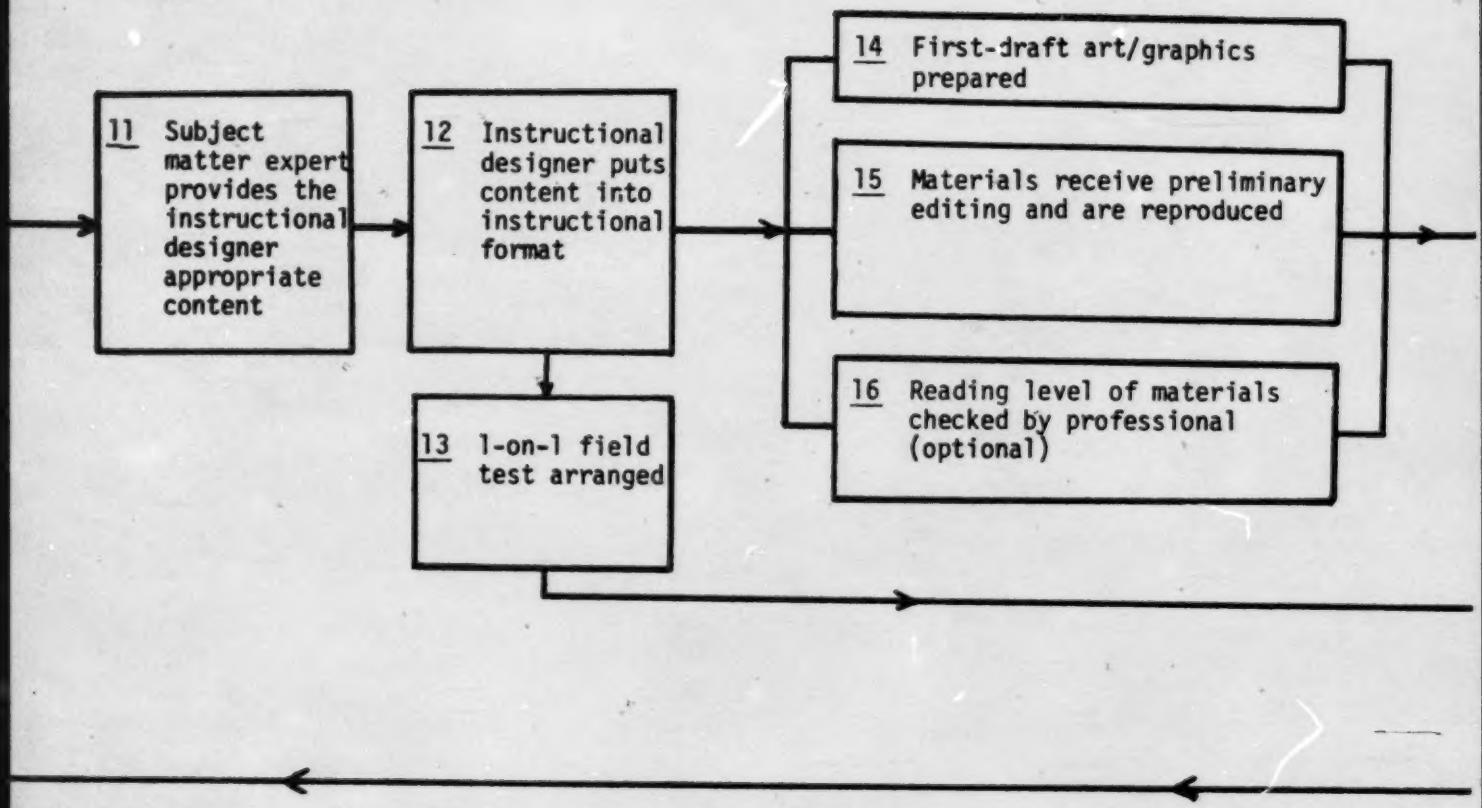
7. The dissemination/diffusion plan included preliminary plans for necessary inservice training. It was timely in that it assigned responsibilities before the project had preceeded so far as to eliminate some dissemination/diffusion options. However, the plan had to be revised many times before it was implemented (see step 38). It took from 1-1/2 months to 5 months to move from steps 7a-7c.


8 CECL conducts learning task analysis (all subsequent steps in model by CECL)
9 Performance objectives and criterion-referenced measures written for each task
10 Preliminary instructional strategy and format developed for materials

8. The learning task analysis was made using logical and impirical inputs to identify and sequence the knowledge, skills, and attitudes necessary to learn and perform the tasks up to the criterion levels. The required learning activity for each task was identified using a modification of Gangne's types of learning hierarchy (Gagne, 1977).

9. It was necessary to have a subject matter expert review the task analysis and the objectives and measures for the tasks.

10. Although the instructional strategies decided upon at this juncture remained fairly constant, the format for the materials changed considerably until the first module (unit) of the instructional materials was developed and field tested.


11 Subject matter expert provides the instructional designer appropriate content
12 Instructional designer puts content into instructional format
13 1-on-1 field test arranged
14 First-draft art/graphics prepared
15 Materials receive preliminary editing and are reproduced
16 Reading level of materials checked by professional (optional)

11. The research librarian worked with other team members to identify reference materials to be used for this purpose.

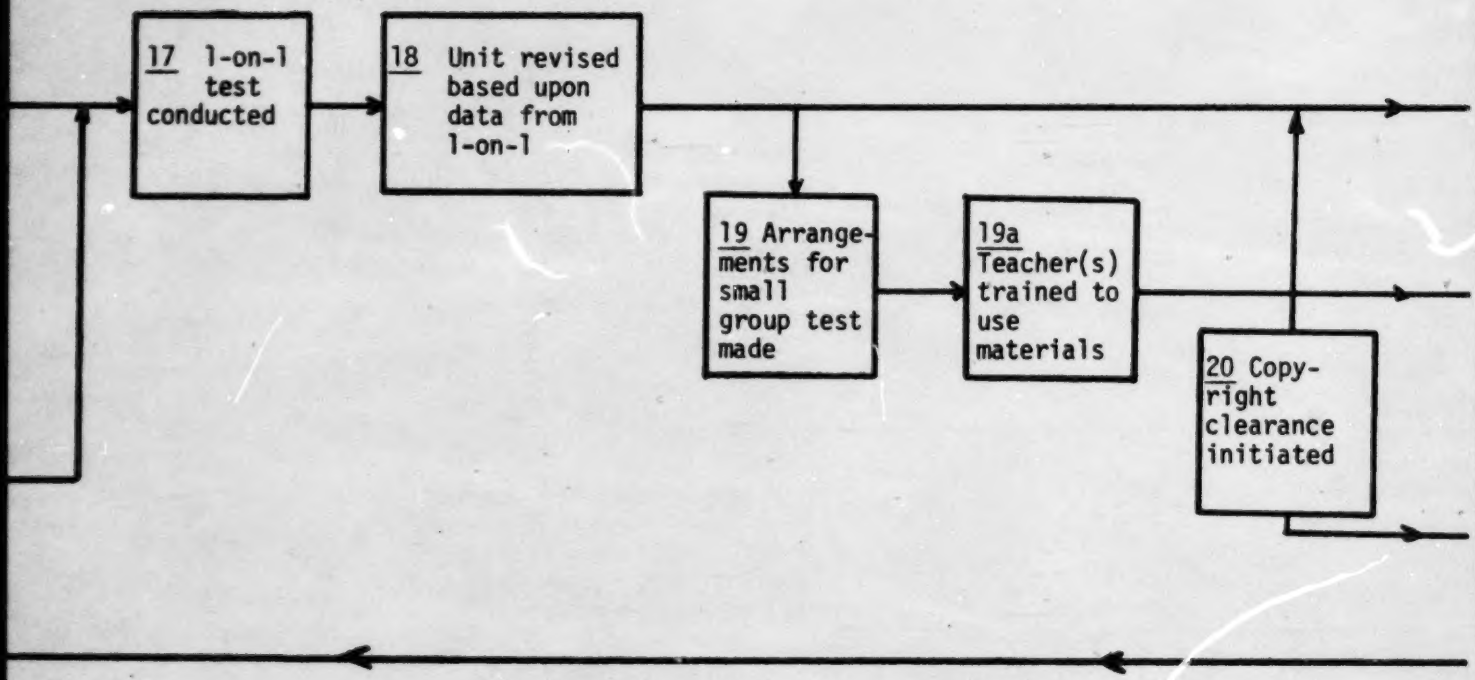
12. Only after the materials were written (first draft) was it possible to say with any accuracy when 1-on-1 test could occur.

13. Arrangements for the 1-on-1 test took from 2-10 work days (part-time) to complete.

14. Very simple "line art" or "stick figures" were sufficient at this point.

15. Editing and reproduction took approximately 2 weeks (full time).

16. Reading levels were checked by professional and/or editor for student-oriented materials; professional opinions and suggestions proved to be more accurate and useful.


17 1-on-1 test conducted
18 Unit revised based upon data from 1-on-1
19 Arrangements for small group test made
19a Teacher(s) trained to use materials
20 Copyright clearance initiated

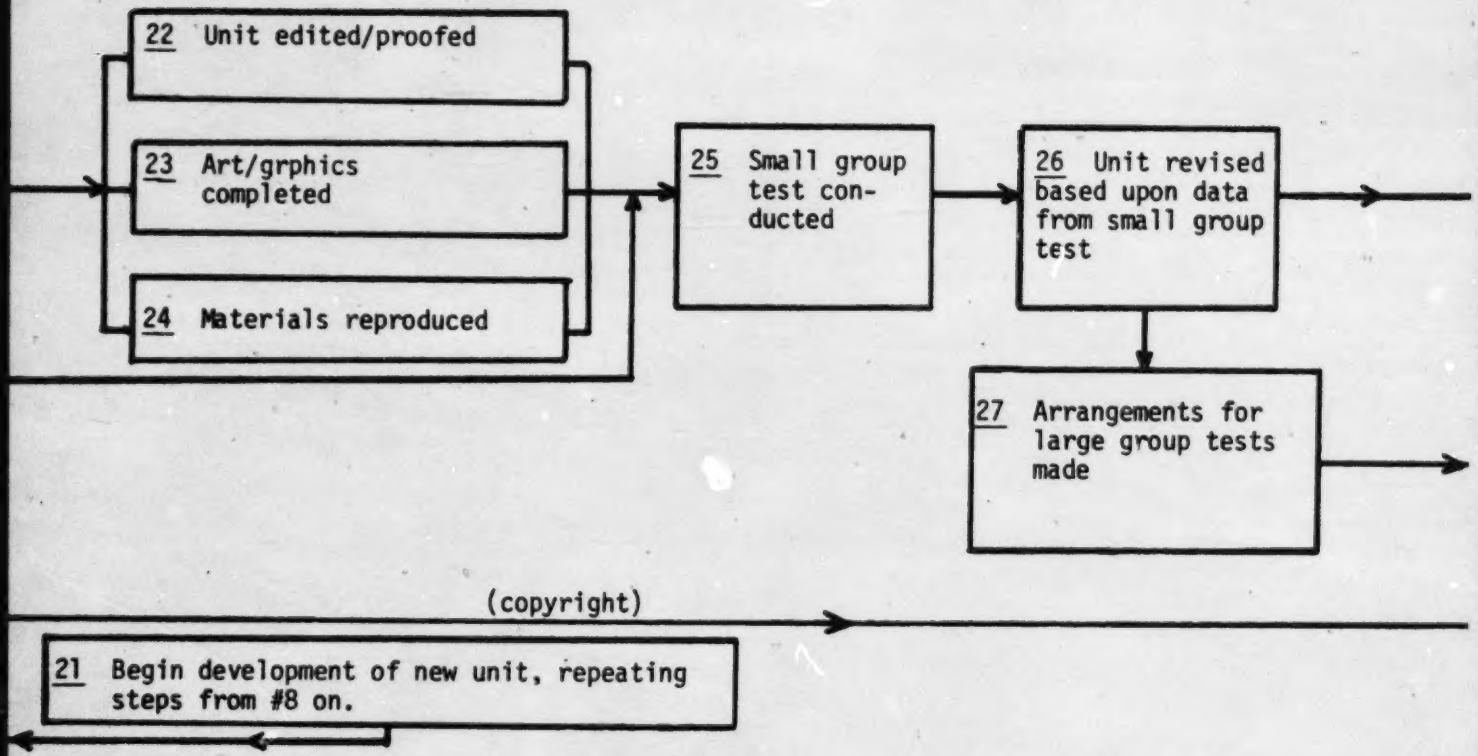
17. The 1-on-1 test consisted of 3-8 subjects, in a non-realistic situation, and was administered by project staff; subjects were sometimes paid to go through the materials.

18. Revision took from 2-4 weeks, exclusive of editing, art, etc.

19. Arrangements involved 1 or 2 classes of students and took between two-four weeks (part time) to complete and involved approvals by school district superintendents, supervisors, principals, and teachers.

19a. If classroom teachers were to conduct the test they had to be trained to use the materials and collect the data, which took from 1-3 days, full time.

20. Copyright clearance was handeled by a research librarian and took from 3 months to 1 year (part time) per unit.


22 Unit edited/proofed
23 Art/grphics completed
24 Materials reproduced
25 Small group test conducted
26 Unit revised based upon data from small group test
27 Arrangements for large group tests made
(copyright)
21 Begin development of new unit, repeating steps from #8 on.

21. Time for original development of new units was limited to the time between field tests and revisions. After the 1-on-1 revision, which occured immediately after the test, there was generally a gap of two-six weeks between the time the materials went through production (editing, art, reproduction) and field testing, and when the original developers had to return to revise them.

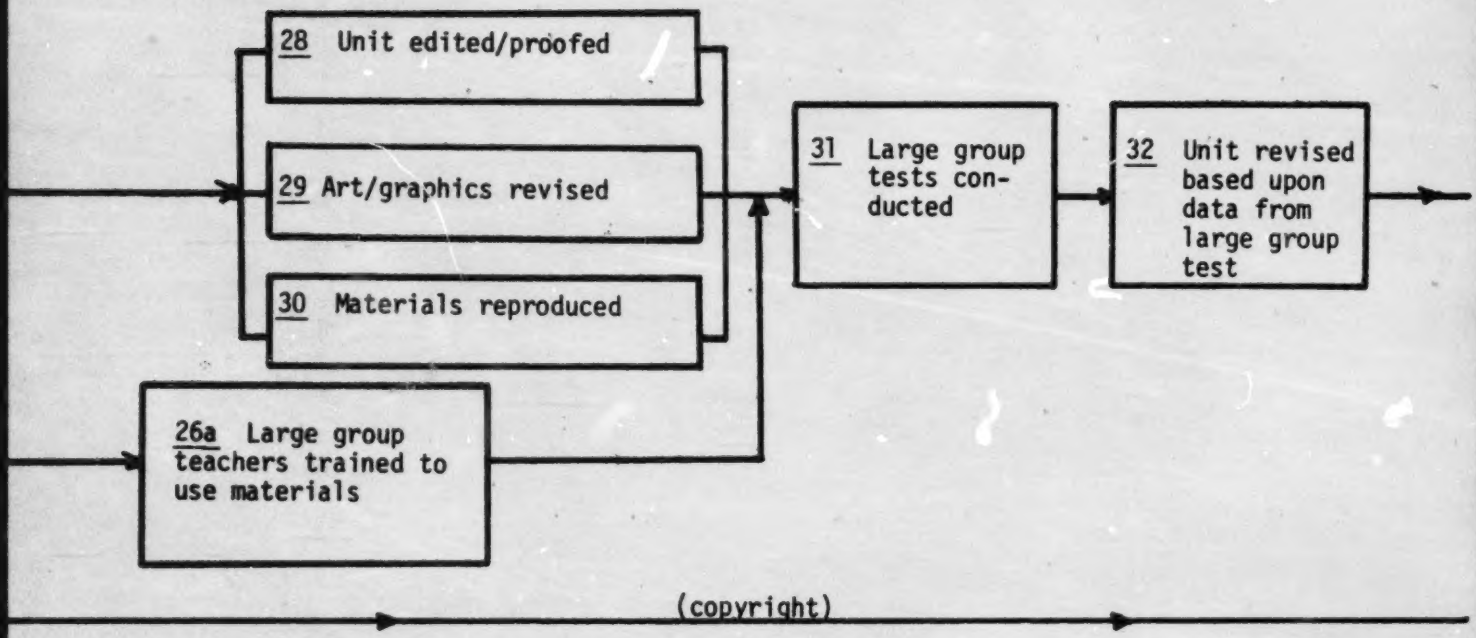
22. Editing, retyping, and proofing usually took 3-6 weeks.

23. Art was considered "finished" except for minor changes.

25. The small group test involved from 20-40 subjects in a quasi-realistic situation, and was administered by a classroom teacher. This test was omitted in developing teacher-oriented materials.

26. Revisions took approximately 2-4 weeks.

27. Arrangements for 60-200 subjects took 2-6 weeks to complete. In some projects the hierarchically dependent nature of the subject matter required the use of the same groups of students for all large group tests of the units.


28 Unit edited/proofed
29 Art/graphics revised
30 Materials reproduced
26a Large group teachers trained to use materials
31 Large group tests conducted
32 Unit revised based upon data from large group test
(copyright)

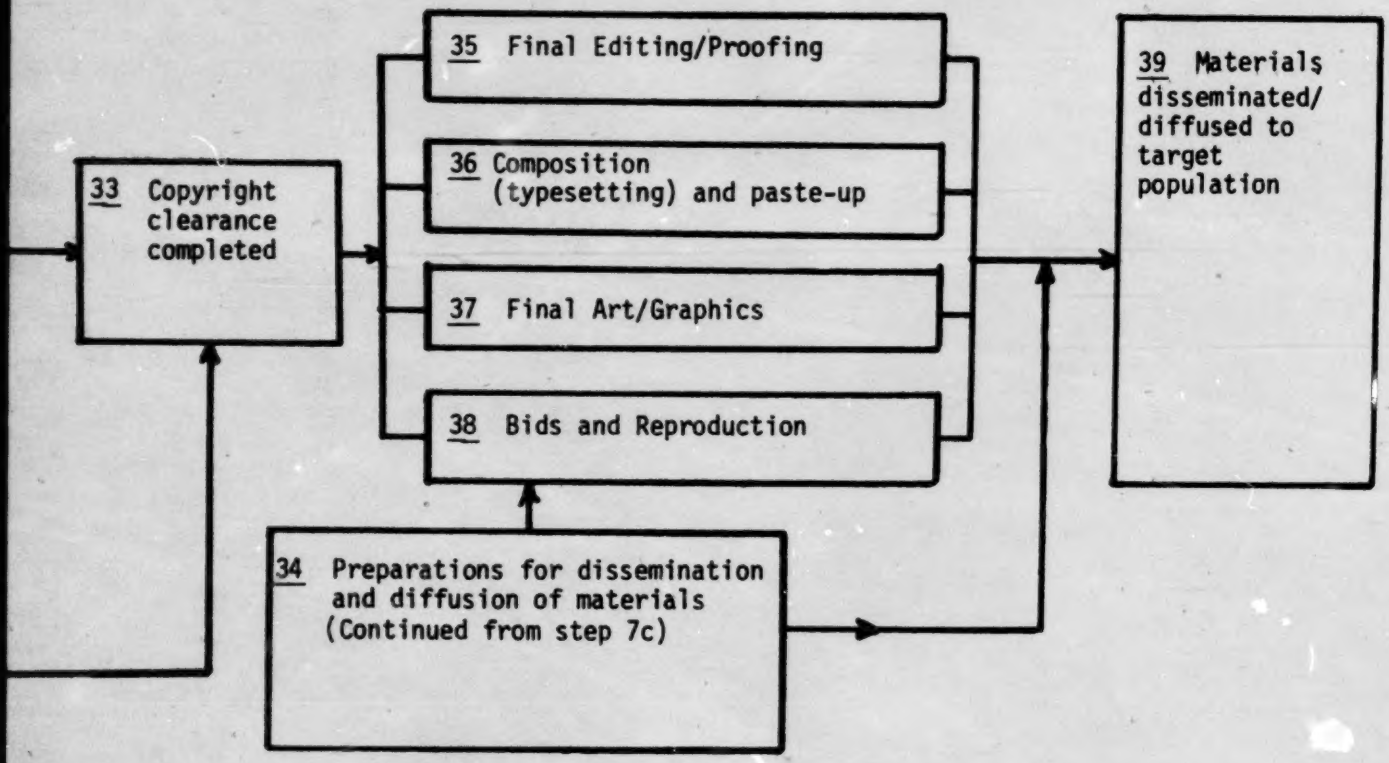
28. Editing and proofing took 2-4 weeks.

29. Art/graphics took 2-3 weeks and were revised concurrently with editing.

30. The reproduction of materials took 2-3 weeks.

31. The large group test was conducted with a stratified sample of subjects from the target population, in a realistic situation, and was administered by a classroom teacher. In 20 units which were tested under similar circumstances, most subjects were able to accomplish twenty percent or less of the objectives on the pretests, but the great majority accomplished between eighty and ninety-five percent on the posttests. The single unit which was an exception to this was one which required considerable arithmetic/computational skills where most subjects scored in the sixty-five to seventy-five percent range.

32. Final revisions took 3-5 weeks, including collecting and analyzing the considerable amounts of data.


35 Final Editing/Proofing
36 Composition (typesetting) and paste-up
37 Final Art/Graphics
38 Bids and Reproduction
33 Copyright clearance completed
34 Preparations for dissemination and diffusion of materials (Continued from step 7c)
39 Materials disseminated/ diffused to target population

33. Copyright clearance was completed for most units before the small group field test (step 25). Step 33 was the final point before reproduction that any outstanding copyright problems might be resolved.

34. This is a continuation from step 7c. It took from 2-1/2 to 10 months for preparations to be completed. This included the preparation of inservice training materials to train the teachers (or supervisors).

35-38. Final preparation of the materials took from 2-1/2 months to 17 months, with some overlapping of delivery dates for some units. The DVE provided separate funding for final production of the materials.

39. Dissemination/diffusion meetings, held as they were during the school year, were commonly spread out over a period of 1-1/2 to 4 months. The meetings ranged from 3-1/2 hours to two days, per set of materials.)

Six major instructional/curricular material development projects were assigned to CECL:

1. Project Pro-CESS. The goal of this project was to produce an in-service training package which would transmit to educators the basic concepts of career education. The resultant products were a self-instructional 106 page book (Division of Vocational Education, 1974), which took approximately 3 1/2 hours to complete, two posters, and a 15 minute introductory slide tape. Approximately thirty-nine thousand copies from three editions were distributed in Florida.

No formal assessment was made of the need for this project. However, because the federal government had made matching funds available for career education programs, the State of Florida allocated funds and mandated that such programs be started statewide. Some research studies had shown that knowledge about career education was very limited (Bailey, Hannum, Piotrosky, Stoker, & Waters, 1973), the need was evident.

The potential target populations for Pro-CESS were the 18,000 full-time vocational-technical teachers in the state; all other academic teachers in Florida, K-12; educational supervisors and administrators; and non-educators, such as school board members, parents, and university students who were interested in the basic ideas of career education.

The objectives for career education: An Introduction was developed by the project staff through subject matter expert interviews and review of the literature, and validated by expert concurrence. All sixteen instructional objectives were basically cognitive in nature.

The task team consisted of four full-time individuals for three months (total: approximately 12 person-months) who were responsible for instructional design, development and testing, plus art/graphics, editing, information services, and diffusion personnel. It took approximately five months to go through an abbreviated version of the development model (including 2 months for final production/reproduction), then the materials were disseminated and diffused to the target population.

2. Project G.R.O.W. The purpose of project G.R.O.W. was to help teachers infuse career education into existing curricula through activiey-based instruction. This was to be accomplished by providing teachers a teaching resource (activity cards) which presented examples of activity-based career education instruction and teaching them to develop their own activities using the G.R.O.W. format. The products which resulted from this project were four sets of G.R.O.W. Activity Cards K-2, 3-6, 7-9, 10-12 (Division of Vocational Education, 1975); a five-hour inservice package which consisted of a trainer's guide, two slide tape presentations; and a consumable 49 page Participant Booklet. Approximately sixteen thousand sets of the activity cards and participant booklets were reproduced.

No formal assessment was made of the need for Project G.R.O.W. After an informal assessment of instructional content, instructional objectives were developed by the G.R.O.W. project staff. The objectives received no further validation. Most of the objectives were mainly knowledge oriented.

The potential target population for G.R.O.W. was all of the state's academic teachers (K-12) and vocational teachers (9-12).

The G.R.O.W. task team consisted of one full-time individual for 11 months, one person full-time for 4 months, and two people half-time for 8 months (total: approximately 23 person-months) who were responsible for instructional design, development, and testing, plus art/graphics, editing, information services, and diffusion personnel. It took approximately 17 months to go through an abbreviated version (testing was limited to teacher validation) of the development model (including 8 months for final production and reporduction) until the materials were disseminated and diffused to the target population.

3. Florida/V-TECS Project. The goal of the Florida/V-TECS Project was to develop an inservice training package which would prepare vocational-technical educators to use Florida/V-TECS catalogs of objectives in competency-based programs. The products which resulted from this project were a Training Leader's Kit (Division of Vocational Education, 1976), which consisted of three film strips, three cassette tapes, a Leader's Manual, an example of a Florida/V-TECS catalog, a roster of inservice trainers and two informational brochures. In addition, a 109 page self-instructional Participant Activity Guide was developed for use by vocational teachers during the 4-hour inservice programs. Three hundred and twenty-five copies of the Training Leader's Kits and 5,000 Participant Activity Guides were disseminated and diffused to the target group.

No formal needs assessment was conducted of the need for the Florida/V-TECS Project. However, as the Division of Vocational Education had joined V-TECS and decided to disseminate and diffuse catalogs to vocational/technical teachers around the state, the need for systematic procedure for doing this was evident.

The potential target population was all of Florida's 18,000 full-time and 6,000 part-time vocational-technical teachers.

The thirty-two knowledge-oriented instructional objectives in the Participant Activity Guide were prepared by the project staff after interviews with members of the target group and vocational-technical district, regional, and stage-level administrators. No additional validation was done for the objectives.

The task team consisted of one-full-time individual for 9 months, one for 8 months, two people full-time for two months, and one person full-time for five months (total: approximately 26 person-months) who were responsible for the instructional design, development, and testing. The art/graphics, editing, information services, and diffusion personnel time consumed roughly an additional 20 person-months. It took approximately 11 months to go through the development model (including 4 months for final production/reproduction) until the materials were disseminated and diffused to the target population.

4. Nursery Operations (Horticulture) Project: The goal of this project was to prepare instructional materials which would train students to be nursery operations (horticulture) workers. The products resultant from this project were eight self-instructional Unit Guides (57-119 pages each), with an accompanying Field Guide for all units (211 pages); pretests and posttests for each unit; a manual with technical data and color reproductions of 180 decorative plants; an orientation unit with two filmstrips and cassettes; five posters and an Instructor Guide (489 pages) which contains inservice materials and management suggestions for all of the materials. In all, the package contained approximately 150-200 hours of instruction. Four thousand copies of the student units, 9,000 of the consumable workbook, and 350 copies of the teacher materials were reproduced.

No formal assessment was made of the need for this project. The need for workers in this field was supported by the DVE program staff and industry studies.

The target population consisted of approximately 3,500 students per year who were enrolled in 210 nursery operations programs in the state. The programs were found in high schools, community colleges, and vocational-technical centers.

Objectives came from a non-V-TECS catalog which had been previously developed by the DVE (see Section II of this paper) and validated by nursery owners and managers in Florida. Of all 411 objectives in the original catalog, this project focused on the fifty-two performance objectives which the catalog designated as the most critical. A learning task analysis broke these critical objectives into 101 instructional objectives, which were predominantly knowledge and skill oriented, with only a few attitudiual objectives.

The design, development, and validation of the materials consumed approximately 74 person-months. The art/graphics, editing, and information services personnel's time can be grossly estimated at an additional 56 person-months. In addition, almost one full-year (11 person months) was dedicated to dissemination/diffusion. It took approximately 42 months to go through the development model (including 20 months for final production/reproduction; excluding the time to develop the catalog of objectives) and to begin dissemination/diffusion of the materials to the target group.

5. The Employability Skills Project: The goal of this project was to develop a set of instructional materials which would teach students how to get a job, keep a job, and get ahead on the job. The products resultant

from this project were six self-instructional units (from 68-177 pages each) with an instruction'r guide for each (from 30 to 80 pages each); a simulation board-type game; an introductory filmstrip and cassette tape; and an annotated resource guide (88 pages).

The entire set contains approximately 60 to 80 hours of instruction. Approximately 12,000 copies of the materials were reproduced in the first cycle.

No formal assessment was made of the need for this project. However, numerous studies had demonstrated the importance for workers to have both vocational and employability skills to be successful on the job.

The potential target population for this project was all of the students, 7 through adult, in both vocational and academic education in the state. There were approximately 938,000 students enrolled in vocational-technical education alone in 1974 (Fitzgerald & Lee, 1975).

Objectives for these materials had been produced earlier in a non-V-TECS catalog (see Section II of this paper) and had been validated by teachers in the field, as well as employers. Approximately 79 performance objectives from this catalog were put through a learning task analysis, and yielded 65 major knoweldge, skills, and attitude-oriented instructional objectives.

The design, development, and validation of these materials took approximately 78 person-months. The art/graphics, editing, and information services personnel's time is estimated at an additional 59 person months. In addition, 40 person months have been devoted (so far) to dissemination and diffusion of the materials. It took approximately 31 months to go through the develop-

ment model (including 12 months for final production and reproduction; excluding time necessary to develop the catalog and to begin dissemination/diffusion to the target group).

6. The Auto Mechanics Project. The goal of this project was to develop a set of instructional materials which would train students to be entry-level auto mechanics. By far the most ambitious project undertaken by the DVE, and CECL, nine blocks of instruction are planned, only the first Engine Tune-Up Service, of which was developed using an abbreviated version of the model described in this paper. The products in the first completed block are six self-instructional student guides (from 70 pages to approximately 330 pages in each), six corresponding review exercise books, nine posttest booklets, and one instructor guide for the entire block. The first block contains approximately 300-350 hours of instruction. In the initial printing, 5,5000 copies were reproduced.

No formal needs assessment was made of the need for this project. The target population consisted of approximately 17,500 students enrolled each year in automotive mechancis courses in Florida's high schools, community colleges, and vocational-technical centers.

Before beginning the development of these instructional materials, the DVE assigned CECL the task of producing an automotive mechanics V-TECS catalog. Of the 223 worker validated objectives in the catalog, 39 performace objectives were selected for the six units in Engine Tune-Up Service.

The task team devoted 103 person-months to the design, development, and validation of the materials. The time spent by editing, information services, and art/graphics personnel may be grossly estimated at an additional 77 person-months. An additional 13 person-months was spent in CECL's development

of the V-TECS catalog. It took approximately 44 months for this block to go through the development model (including 11 months to develop the catalog, and 4 months for final production and reproduction) and to begin the dissemination/diffusion process to the target groups.

A summary of these six projects, along with gross estimates of costs for one year and five years for running such projects is presented in Table 1. It must be emphasized that these are estimates and should be treated as such. Several comments about how the estimates were calculated are in order:

1. In column 4, if exact amounts were not available, the dollar amounts were arrived at by using an average yearly salary of $14,000, or a monthly figure of $1,166.66, and multiplying that by the number of person-months.

2. In column 5, the dollar amounts were calculated by using an average yearly salary of $10,000, or a monthly figure of $833.33 and multiphying that by the number of person-months. The estimate of person-months spent on editing, art/graphics, and information services is a gross estimate, but a conservative one. The Auto Mechancis Project eliminated one production cycle, so that this figure was reduced proportionately.

3. Additional project costs (column 6) include travel, equipment rental, materials, supplies, etc. These amounted, on the average, to 30% of project costs (excluding reproduction) and was estimated in column 6 on that basis.

4. In column 7, the cost of "reproduction" includes all costs for final illustration, typesetting, paste-up, and proofing. This is in addition to time/costs shown in column 5.

5. In column 8, it is assumed that all materials disseminated to teachers for projects Pro-CESS and G.R.O.W. have been used, so these figures are identical to the number of copies reproduced. It is assumed that 18,000 full-time teachers will have attended a Florida V-TECS session within five years. The figures for Nursery Operations, Employability Skills and Automotive Mechanics are very conservative, in that they assume that the materials will be used for five years, at the same rate as in the first year of dissemination.

6. The estimated total cost for the first year (column 9) was calculated by adding columns 4, 5, 6, and the one year reproduction figure in column 7.

7. The estimated total cost after five years (column 10) was calculated by adding columns 4, 5, 6, and the five-year figure in column 7. It is assumed that if any consumable materials were reproduced, they would be sold at cost to Florida consumers, rather than given away free of charge as they were in the first printing.

A major imponderable has been whether or not Florida would sell these materials to out-of-state consumers. Problems were originally encountered in this area, but are slowly being resolved. However, any revenue generated by the sale of the materials would have to be subtracted from the estimates in columns 9, 10, 11, and 12. The high quality of the material, both from instructional and aesthetic points of view, could mean that sales would reduce or even eliminate the total costs involved. However, potential sale estimates have been excluded from these estimates.

Table 1. Summary of Data for Six DVE Projects with Estimated Costs for One and Five Years

	(1) APPROXIMATE NUMBER OF HOURS OF INSTRUCTION	(2) APPROXIMATE NUMBER OF PERFORMANCE OBJECTIVES	(3) ESTIMATED NUMBER OF INSTRUCTIONAL OBJECTIVES DESIGN, DEVELOPMENT, AND VALIDATION	(4) ESTIMATED NUMBER OF PERSON-MONTHS/COST OF ART/GRAPHICS, EDITING, INFORMATION SEARCHES	(5) ESTIMATED ADDITIONAL PROJECT COSTS	(6) ESTIMATED COST OF REPRODUCTION	(7) ESTIMATED NUMBER OF USERS FOR ONE/FIVE YEARS	(8) ESTIMATED TOTAL COST FOR ONE/FIVE YEARS	(9) ESTIMATED COST PER USER FOR THE FIRST YEAR	(10) ESTIMATED TOTAL COST AFTER FIVE YEARS	(11) ESTIMATED COST PER USER AFTER FIVE YEARS
PROJECT PROCESS	3.5	NA	16	NA	NA		NA	NA	--	--	
				21,070	8,849	13,081	62,000	39,000		105,000	$2.69
PROJECT GROW	5.0	NA	--	23 mos.	23 mos.		NA	NA	--	--	
				26,833	19,167	19,714	24,400	16,000		90,114	$5.63
FLA/V-TECS INSERVICE PROJECT	4.0	--	32	26 mos.	20 mos.			NA		--	
				36,665	16,667	24,999	13,108	18,000	91,439	91,439	$5.08
NURSERY OPERATIONS PROJECT	150-200	52	101	74 mos	56 mos		119,620	3,500			
				86,333	46,666	63,428	119,620	17,500	396,047	396,047	$22.63
EMPLOYABILITY SKILLS PROJECT	60-80	79	65	78 mos	59 mos		73,374	12,000			
				90,999	49,166	66,857	173,374	60,000	280,396	280,396	$4.67
AUTOMOTIVE MECHANICS PROJECT	300-350	39	--	103 mos.	77 mos		--	5,500			
				120,166	64,166	88,285	--	27,500	--	--	--

V. DISSEMINATION/DIFFUSION

The DVE has developed many products focused on the improvement of instruction in the state's vocational programs. Earlier experiences with the diffusion process convinced the decision makers in the DVE that a carefully designed plan should also be developed for each major product that was selected for diffusion. Therefore, a complete set of inservice training materials were developed for each diffusion effort. No materials were distributed to local educational personnel without prior participation in the inservice program.

Florida is divided into five regions to provide services to vocational personnel throughout the state. Each region has a director responsible for operations and a consultant in each of the vocational program (discipline) areas. These consultants provide services directly to vocational instructors, supervisors, and administrators in secondary schools, area vocational-technical centers, and junior colleges. To supplement this structure, a dissemination/diffusion section was created.

The dissemination and diffusion (D&D) section is responsible for meeting the production, distribution, and storage demand created by developmental activities. It maintains a statewide system of dissemination and diffusion, providing products, procedures, and practices of proven value to targeted groups of educators. The process includes identification of the users and dissemination (distribution) of the products to them. Diffusion is a process of providing educators an opportunity to explore, test, and make decisions to accept or reject, in whole or in part, products designed to improve educational programs. The specific functions of the dissemination and diffusion section are to:

1. Develop a dissemination and diffusion system that will involve representatives of the Florida Department of Education and its regional offices, universities, community colleges, school districts, and the U.S. Office of Education, as necessary, in the development and implementation of plans for reproducing, packaging, distributing, and diffusing vocational education materials developed by projects.

2. Develop, with the assistance of project directors, descriptions of benefits, costs, and organizational arrangements needed to utilize the products being developed.

3. Develop, with the assistance of project directors, educational consultants, local educators, and other appropriate persons, a description of the needs of potential users of the products to be disseminated and diffused.

4. Develop, with the assistance of educational consultants from the Department of Education, local educators, and other appropriate persons, a description of advocate roles to disseminate and diffuse the product.

5. Select and state objectives to be achieved in the change process in terms of providing user groups an opportunity to: (a) become aware of products useful in solving problems; (b) make indepth explorations into elements of the advocated change having direct interest to them; (c) use the advocated change having direct interest to them; (d) use the advocated product in a limited way as a basis for; (e) evaluating the benefits to their problems; and (f) an opportunity to accept or reject, in whole or in part, the product being advocated.

6. Develop cost-effective methods for reproducing, packaging, and distributing the products to be diffused.

7. Develop strategies and activities to achieve each objective for each user group served.

8. Develop time sequence charts and budgets for each strategy and activity.

9. Manage the implementation of each strategy, using educational consultants available in the regional offices as facilitators, and provide additional human and material resources through grants.

10. Develop and conduct, with assistance from educational consultants in regional offices and staff in the evaluation section, an impact study of the diffusion plan as a basis of providing information needed for evaluation and possible revision.

11. Develop and present interim and final reports of the dissemination and diffusion plans to appropriate personnel in the DVE, other offices within the Florida Department of Education, and the U.S. Office of Education.

12. Prepare and submit a long-range and annual budget for dissemination and diffusion plans for inclusion in the budget.

13. Monitor funded dissemination and diffusion projects to determine success, identify problems in operating the plan, and correct deficiencies.

14. Establish working relationships with organizational units within and outside the Department of Education having dissemination and diffusion responsibility to eliminate unwarranted duplication of effort, stay abreast of pertintinent developments, and shart resources.

15. Review and recommend needed changes in policies and procedures for dissemination and diffusion of improved vocational education products.

As the dissemination and diffusion process is refined, and the needs of the state are further delineated in terms of disseminating and diffusing materials, these listed functions may vary. However, dissemination/diffusion activities will continue to provide vocational educators with products designed to improve instruction in vocational classrooms.

VI. FLORIDA'S PRESENT VOCATIONAL CURRICULUM DEVELOPMENT SYSTEM

Although the quality of the materials produced using the procedures already described is quite high, the time and money involved in such undertakings have led to the following conclusions:

1. The need for instructional materials must be determined at the instructor level, using a discrepancy model (Kromhout, 1978).

2. Prioritization of needs between courses must follow the identification of the needs (Kromhout, 1978).

3. An exhaustive search for available instructional materials or curricular materials must be conducted prior to any consideration to develop materials.

4. If catalogs of objectives do not exist, a consortium approach is a cost effective method for acquiring them.

5. Developing instructional materials by using the procedures previously described is too slow and expensive to be considered the normal procedure for the Division of Vocational Education unless materials are to be sold to recover project expenses. Only in an unusual case where the need for such a long-term project has been identified, where no materials have been found, where the priority is considered of the highest order, and where large numbers of teachers and/or students are involved, can this approach be justified.

6. If these procedures are applied, it may be possible to reduce the amount of field testing and proportionately reduce the time and money involved (Carey, 1976). Editing and proofreading should be reduced to the minimum necessary to test the materials and obtain valid results. Extensive work in art/graphics is only justified if necessary for instructional reasons, if it

is previously determined that the materials will be sold, or if the use of such techniques will reduce the overall cost of the materials. Finally, the direction of task teams who are involved in applying such procedures must be controlled by a single individual who has the authority to direct all phases of the work.

7. Systematic dissemination and diffusion are a necessary and integral part of meeting the needs of vocational teachers and students.

Building on this experience, the DVE has continued funding the Automotive Mechanics Project which has modified the previously described procedures. In addition, the DVE has supported several new projects, or expanded existing ones, to incorporate this experience into a second approach to acquire instructional materials (see Figure 8).

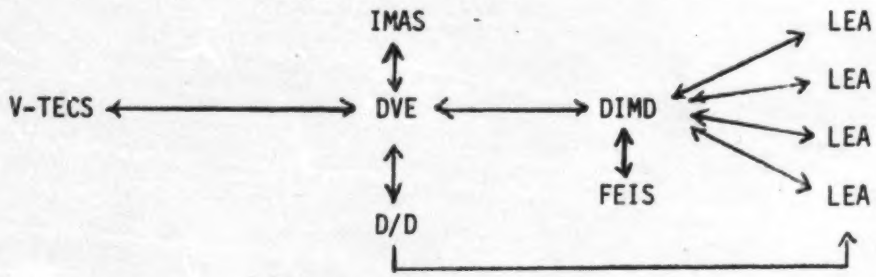


Figure 8. Florida's Alternate Approach to Acquiring Instructional Materials.

(Legend:

V-TECS Vocational-Technical Education Consortium of States.

DVE Division of Vocational Education, Florida State Department of Education

D/D Dissemination/Diffusion Unit, Bureau of Vocational Research, Evaluation, & Dissemination, Division of Vocational Education, Florida State Department of Education

IMAS Instructional Materials Assessment Survey Project, Career Education Center, Florida State University

DIMD Decentralized Instructional Materials Development Project, Career Education Center, Florida State University

FEIS Florida Educators' Information Service, Career Education Center, Florida State University

LEA Local Educational Agencies in Florida, such as school districts, vocational-technical centers, community colleges, and universities)

The first project, called the Instructional Materials Assessment Survey (IMAS) and located in the Career Education Center at Florida State University, surveys courses systematically selected by the Division of Vocational Education to establish the need for instructional materials and catalogs of objectives (Kromhout, 1978). DVE personnel then establish priorities. The DVE may decide to develop a catalog as part of its V-TECS effort, adot/adapt a catalog produced by another V-TECS member, or it may decide to send it through a second project called the Decentralized Instructional Materials Development (DIMD) project, located in the Career Education Center.

The third component, the Florida Educators' Information Service (FEIS is also in CEC) does extensive computer and hand searches to find instructional materials and/or catalogs which may satisfy the identified needs. FEIS also coordinates any necessary copyright clearance. The DIMD staff works with local educational agencies to review and select materials, or develop materials if none are found to exist. In this role, the DIMD staff provides technical assistance and liaison between the local agencies and the DVE. If developed materials need editing, art, or graphics, the Career Education Center may be asked to provide these services as well.

Completed products are then returned to the DVE and sent through the Dissemination and Diffusion Unit and the regional vocational program staffs to the target populations.

This present system combines several aspects of the various models which were discussed, and reflects the increased knowledge and capabilities which have been acquired in recent years. It is still too early to say whether this alternative approach will increase the quality, validity, and availability of

instructional materials which remains the goal of the system. Nor is it yet possible to say if it will reduce the time and money necessary to provide students and teachers with materials. However, preliminary indications are that the system will have some of the desired effects and will prove to be a factor in helping Florida's vocational-technical educators move towards competency-based programs.

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